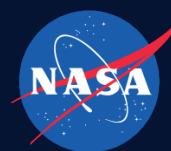


# Tunable Interior Rotorcraft Noise Control Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



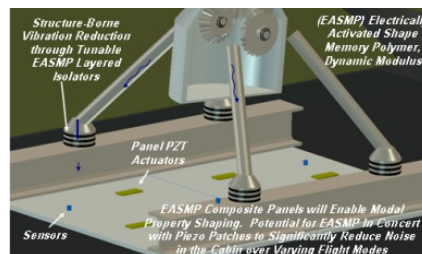
## ABSTRACT

CRG has recently developed a new class of shape memory polymers (SMP) that are electrically activated, as opposed to the more mature thermally activated SMPs. Electrically activated shape memory polymers (EASMP) open a new design space of unexplored functionality beyond what has been considered for thermally activated materials. This project will combine the advantages of EASMP with the design of state-of-the-art gearbox isolators and interior panels to provide the ability to tune these components for specific operational frequencies. With the use of EASMP integrated components, by semi-actively altering the interior panels or gearbox isolators' frequency response, it will be possible to better target and control particularly irritating tones related to the aircraft's flight mode. CRG proposes to advance EASMP maturity which is applicable across many other application areas and has the benefit of alternative stimuli boasting ultra-low power requirements and more potential for faster switching times. This material will be refined and further developed to meet the operational performance requirements for the rotorcraft isolator application.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: Supporting NASA's Aeronautics Research Mission Directorate, this project's technologies directly address requirements for a rapid-response, structural material system capable of quickly changing state for shape change, vibration control, or acoustic attenuation. CRG's electrically activated, variable stiffness composites present the opportunity to achieve all of these functions with a low-power solution to minimize the impact to the overall system and maximizing the overall performance gains. CRG's electrically activated, variable stiffness composites may have broad applicability for NASA in both aircraft and spacecraft applications where aerodynamics, flight control, vibrations, and noise are of

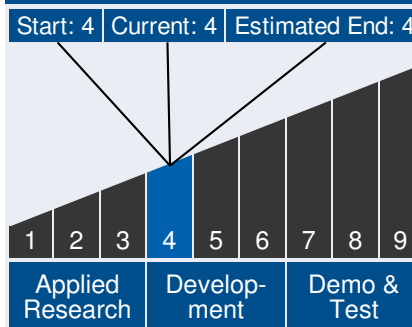


Tunable Interior Rotorcraft Noise Control

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## Technology Maturity



## Management Team

### Program Executive:

- Joseph Grant

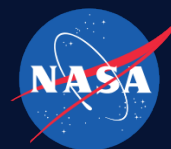
### Program Manager:

- Gary Jahns

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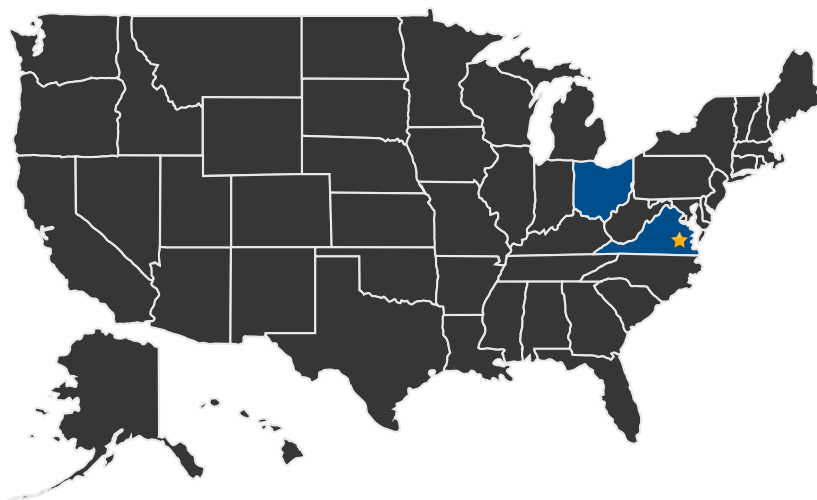


concern.

## To the commercial space industry:

**Potential Non-NASA Commercial Applications:** This project's technologies developed for NASA systems would directly apply to systems operated by other government and commercial enterprises. Government systems that would derive the same benefits would include but not be limited to fixed and rotary wing aircraft, atmospheric reentry vehicles, jet engine components, propulsion systems, and other future aircraft applications that will require adaptive structures, noise suppression, or active vibration damping technology operated by the Department of Defense. This technology's attributes for fixed and rotary wing aircraft should also yield a high potential for private sector commercialization for variable shape components for aircraft structures by Boeing, Lockheed Martin, and GE Aviation, Gulfstream, Bombardier, Cessna, and Dassault.

## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States  
With Work

★ **Lead Center:**  
Langley Research Center

### Management Team (cont.)

#### Project Manager:

- Dexter Blackstock

#### Principal Investigator:

- Jason Hermiller

### Technology Areas

#### Primary Technology Area:

Demonstrate Advanced Ultra High Bypass (UHB) Engine Designs for Specific Fuel Consumption and Noise Reduction (TA 15.3.1.4)

#### Secondary Technology Area:

Nanotechnology (TA 10)

└ Engineered Materials and Structures (TA 10.1)

#### Other Technology Areas:

- Lightweight Concepts (TA 12.2.1)

# Tunable Interior Rotorcraft Noise Control Project

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## Other Organizations Performing Work:

- Cornerstone Research Group, Inc. (Dayton, OH)

## DETAILS FOR TECHNOLOGY 1

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### Technology Title

Tunable Interior Rotorcraft Noise Control